C. ERDMANN.
Rolling Mill.

No. 232,602. Patented Sept. 28, 1880.

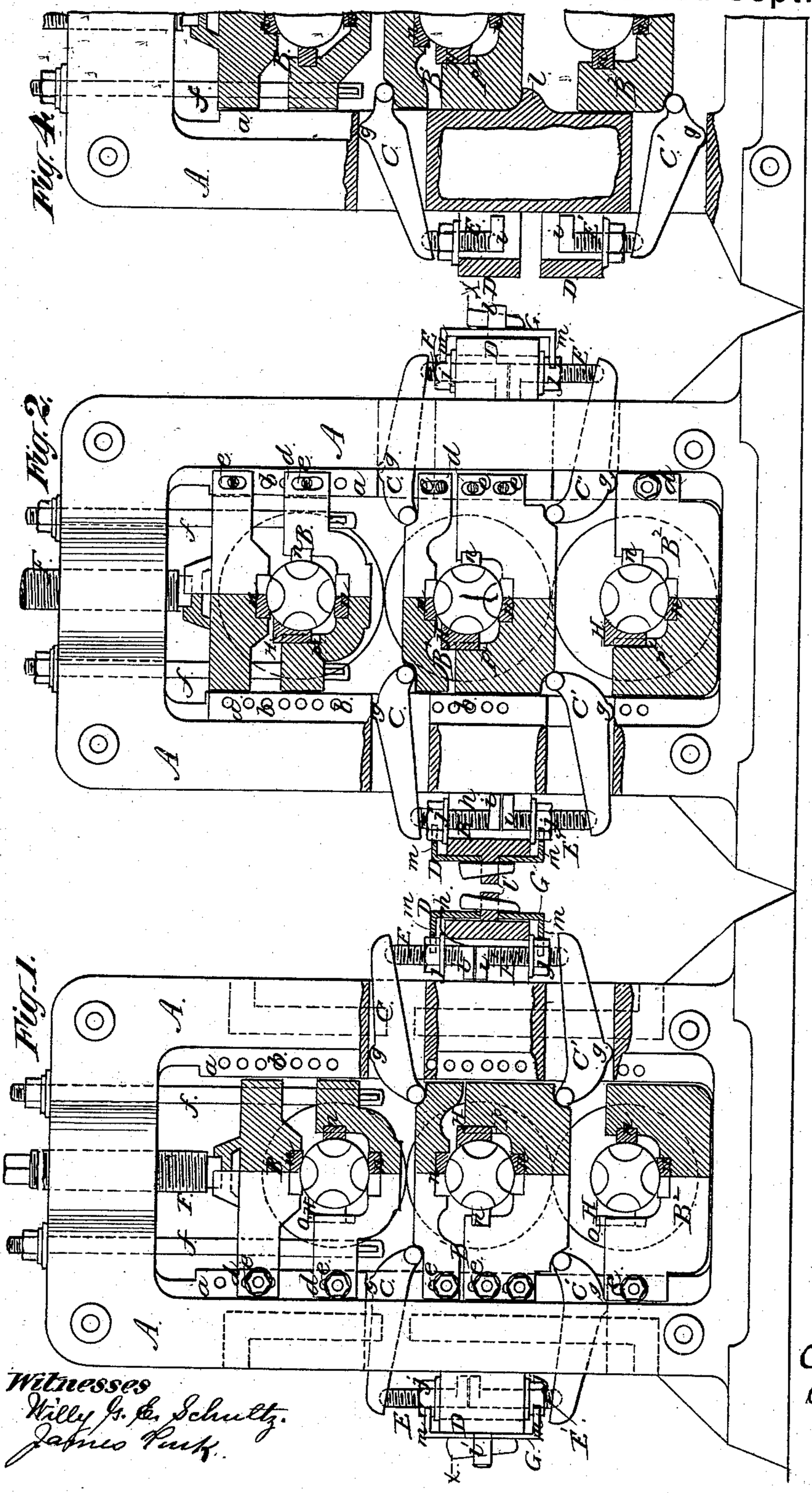

Fig. 1.

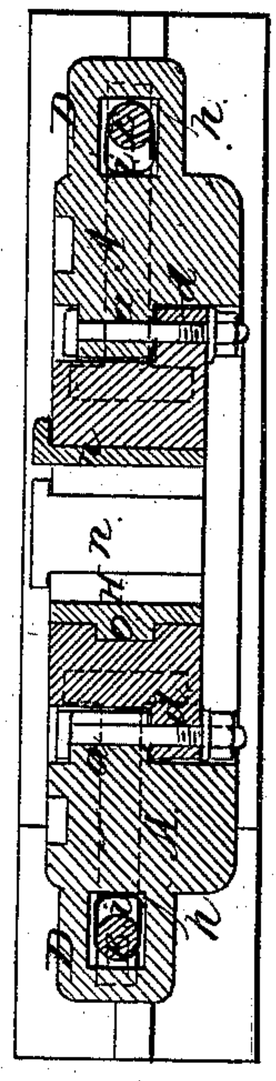

Fig. 3.

Witnesses
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UNITED STATES PATENT OFFICE.

CONRAD ERDMANN, OF DUISBURG-ON-THE-RHINE, PRUSSIA, GERMANY.

ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 232,602, dated September 28, 1880.

Application filed February 27, 1880. Patented in Germany December 7, 1878.

To all whom it may concern:

Be it known that I, CONRAD ERDMANN, of Duisburg-on-the-Rhine, in the Kingdom of Prussia and Empire of Germany, have invented a new and Improved Rolling-Mill, (for which I have obtained a patent in the Empire of Germany, No. 5,714, dated December 7, 1878,) of which the following is a specification.

My invention relates to improvements in means for adjusting the rolls with relation to each other in three-high rolls and other metal-rolling mills; also, to improvements in the brasses in the bearings, and, lastly, to devices for locking the mechanism by which the bearings and rolls are adjusted.

The nature of my invention consists, first, in combining the bearings of the rolls with levers fulcrumed in the housings, and with bolts, bolt-holders, and nuts, so that the said bearings can be quickly and easily moved up and down for the purposes of adjustment.

It consists, secondly, in combining one of the series of brasses in each bearing, which is tapering and self-adjusting by gravity and provided with a feather, with a fixed brass on the opposite side of the bearing.

Other details of my invention will be fully described farther on in my specification in connection with the accompanying drawings, in which—

Figure 1 represents a sectional front elevation of a rolling-mill provided with my improvements, and illustrating the positions to which the rolls are adjusted when they have become worn. Fig. 2 is a similar view of the mill, showing the position of the levers and rolls when the mill is new. Fig. 3 is a horizontal section of Figs. 1 and 2, taken on line *x x;* and Fig. 4 represents, in sectional side elevation, a part of a rolling-mill in which my improved adjusting devices are applied to the middle and bottom roll instead of to the middle roll, as in Figs. 1 and 2.

Referring to the drawings, A represents the frame or housing of a rolling-mill, having on the inner sides vertical flanged guides *a a*, provided with transverse bolt-holes *b*.

B represents the bearing of the upper roll, B′ the bearing of the middle roll, and B^2 the bearing of the bottom roll. The cap and pillow blocks of each of the said bearings fit between the flanged guides *a* of the two sides of the housings, so that the ends of the said blocks move freely up and down in contact with the said guides, and from the ends of the blocks project lips *d d*, which bear against the sides of the flanged guides. The lips *d* are provided with vertical slots *e* in line with the bolt-holes *b*, and through said bolt-holes and slots bolts are passed transversely, which connect the bearings with the housings; but the slots *e* permit a vertical movement of the bearings independent of the bolts.

The upper bearings, B, are hung in the housings by vertical rods *f f*, and the bottom bearings, B^2, rest on the base of the housings; but the middle bearings, B′, are adapted to receive an easy and rapid vertical adjustment in the following manner: Through the housings, on both sides, are passed levers C C C′ C′, the former above the middle bearing, and the latter below the same, which levers are fulcrumed in the housings in any convenient manner. As shown, the levers are provided with semi-circular knobs *g*, which bear in the case of the upper levers, C, against the upper walls of the slots in the housings through which the levers are passed, while in the lower levers, C′, they bear against the lower side or bottom walls of said slots. On these knobs, which furnish a very strong and durable fulcrum, the levers turn easily. The working ends of the upper levers, C C, bear upon the ends of the cap-blocks of the middle bearing, and the lower levers, C′ C′, bear upward against the ends of the pillow-blocks. Slight recesses, it will be observed, are provided to receive the beak-like ends of the levers, to prevent them from slipping away from the ends of the blocks. By means of these levers C C C′ C′ the middle bearing, B′, and with it, of course, the middle roll, can be quickly and easily raised and lowered so as to bring the faces of the several rolls close together. On the outside of the uprights of the housings, between the power ends of the levers, are horizontal projections D D, each provided with an angular vertical mortise, *h*. In the mortises are placed the angular heads *i* of screw-bolts E E E′ E′. The bolts E E point

upward out of the mortises and bear against the power ends of the upper levers, C C, and the bolts E′ E′ point downward and bear against the power ends of levers C′ C′. Nuts *j* are screwed over the ends of the bolts against the bolt-holders D D, and serve to move the bolts in and out of the mortises *h*. The heads of the bolts, it will be observed, being angular, are prevented from turning.

The object of this arrangement of the middle bearing is to enable it to be vertically adjusted to and from the other bearings quickly and easily and with perfect accuracy, to compensate for the wear of the bearings and the journals of the rolls, so as to maintain the same gage. When the mill is new the rolls are set, for example, in the manner illustrated in Fig. 2, wherein it will be observed by the position of the levers the middle bearing and roll are elevated as high as it is possible to elevate them by means of the levers.

As the faces of the rolls and the bearings and journals wear it becomes necessary to readjust the rolls so as to maintain the desired gage. For this purpose the nuts on the lower bolts are turned from the bolt-holders D D, and the stop being thus removed from the power end of the levers, the weight of the middle bearing and roll causes them to gravitate toward the bottom bearing and roll. This movement, of course, follows the movement of the nuts from the bolt-holders D D. Practically, of course, the nuts do not leave the holders D D, and thus they serve as stops, which prevent the sudden and rapid descent of the bearings, which thereby are allowed to move gradually and slowly, thus avoiding endangering the rolls and bearings and enabling the middle roll to be adjusted to the bottom roll exactly as required. When the middle roll is properly adjusted the upper bearing and roll are lowered to the middle roll by unscrewing the nuts of the suspension-rods *f*, and are held down by the adjusting-screw F. The positions assumed by the several parts in making the adjustment of the rolls and bearings are shown in Fig. 1.

A modified arrangement of my invention is shown in Fig. 4. This consists in making the bottom and middle bearings and rolls adjustable. The bearing of the bottom roll, it will be observed, is supported on the lower levers, by which it can be raised and lowered. The pillow-block of the middle bearing is supported on lugs *l* in the housings, while the cap-block is held down by the upper lever, C. By this arrangement the middle bearing and roll are held stationary, while the bottom roll is adjusted to it by the lower levers bearing up against its bearings, and the upper roll is adjusted downward in the same manner as previously described.

The levers are operated by screw-bolts arranged as in Figs. 1 and 2, except that there are separate bolt-holders for the upper and lower bolts.

To prevent the rolls from losing their adjustment I provide mortised locking-plates G, which are placed over the slotted projections *l′* on the bolt-holders, and are fastened thereto by keys. These plates have right-angular parts *m m*, with recesses in the ends, which clasp the nuts *j* and prevent them from turning.

The fixed brasses *n* are connected with the pillow and cap blocks by inserting them in grooves in the cavities of the blocks; but the brasses H are arranged to adjust themselves in the pillow-blocks so as to move downward as the shafts wear and become thinner, and thereby, by forcing the journals against the brasses, maintain a close bearing. To this end the brasses H have a vertical feather, *o*, on their straight part, which fits into a vertical groove, *p*, in the pillow-block. When the brasses H, which are tapering, as shown in Fig. 2, are new, their width at the top is such that they cannot pass down to the bottom of the groove *p*, as shown in the drawings; but as the journals wear they gradually sink downward, whereby they force the journals against the other brasses, and also crowd themselves against the journals, thus enabling the bearings to be kept tight so long as the said brasses have space to move downward. By partly overlapping the journal they prevent clogging.

I claim—

1. In a rolling-mill, the two pairs of levers C C′, in combination with the housings A, bearing B′ of the adjustable roll, bolts E, bolt-holders D, and nuts *j*, for operating the said levers on opposite sides of the journal, substantially as described.

2. In combination with the holders D, the nuts *j*, bolts E E′, and levers C C′, the locking-plates G and bearings B′, substantially as described.

3. The self-adjusting brass H, made of tapering form and provided with the upright feather *o*, in combination with the block having upright groove *p* on one side and fixed brass *n* on the other side, substantially as described.

This specification signed by me this the 10th day of November, 1879.

CONRAD ERDMANN,
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Witnesses:
KARL JANCOKE,
KARL NICHOLSEN.